

We Claim:

1           1. A disposable glucose test strip for use in a  
2           test meter of the type which receives a disposable test  
3           strip and a sample of blood from a patient and performs an  
4           electrochemical analysis of the amount of glucose in the  
5           sample, comprising:

6                 (a) a substrate;  
7                 (b) a reference electrode;  
8                 (c) a working electrode, said working electrode  
9                 comprising a conductive base layer disposed on the substrate  
10               and a first working coating disposed over the conductive  
11               base layer, said first working coating comprising a filler  
12               having both hydrophobic and hydrophilic surface regions such  
13               that it forms a network upon drying, an enzyme effective to  
14               oxidize glucose, and a mediator effective to transfer  
15               electrons from the enzyme to the conductive base layer; and  
16                 (d) means for making an electrical connection  
17               between the reference and working electrode and a glucose  
18               test meter.

1           2. The test strip of claim 1, wherein the  
2           working layer is non-conductive.

1           3. The test strip of claim 2, wherein the filler  
2           is silica.

- 1           4. The test strip of claim 3, wherein the  
2 conductive base layer comprises conductive carbon.
- 1           5. The test strip of claim 3, wherein the enzyme  
2 is glucose oxidase.
- 1           6. The test strip according to claim 3, wherein  
2 the mediator is ferricyanide.
- 1           7. The test strip of claim 3, wherein the first  
2 working layer is formed from an aqueous composition  
3 comprising weight 2 to 10 % by weight of a binder 3 to 10 %  
4 by weight of silica; 8 to 20 % by weight of a mediator; and  
5 1000 to 5000 units per gram of the aqueous composition of an  
6 enzyme for oxidizing glucose.
- 1           8. The test strip of claim 3, wherein the silica  
2 is Cab-o-Sil TS610.
- 1           9. The test strip of claim 8, wherein the  
2 conductive base layer comprises conductive carbon.
- 1           10. The test strip of claim 8, wherein the enzyme  
2 is glucose oxidase.

1           11. The test strip of claim 8, wherein the  
2           mediator is ferricyanide.

1           12. The test strip of claim 8, wherein the first  
2           working layer is formed from an aqueous composition  
3           comprising weight 2 to 10 % by weight of a binder 3 to 10 %  
4           by weight of silica; 8 to 20 % by weight of a mediator; and  
5           1000 to 5000 units per gram of the aqueous composition of an  
6           enzyme for oxidizing glucose.

1           13. The test strip of claim 3, further comprising  
2           a second working layer comprising silica, a binder and a  
3           mediator but no glucose-oxidizing enzyme.

1           14. The test strip of claim 3, further comprising  
2           a second working layer comprising silica and a binder but no  
3           glucose-oxidizing enzyme.

1           15. The test strip of claim 1, further comprising  
2           a second working layer comprising a filler, a binder and a  
3           mediator but no glucose-oxidizing enzyme.

1           16. The test strip of claim 1, further comprising  
2           a second working layer comprising a filler and a binder but  
3           no glucose-oxidizing enzyme.

1                   1  
2 17. An aqueous composition comprising a binder, a  
3       filler having both hydrophobic and hydrophilic surface  
4       regions, at least one of an enzyme effective to oxidize  
      glucose and an electron transfer mediator.

1                   2                   1  
2 18. The composition of claim 17, wherein the  
      filler is non-conductive.

1                   1  
2 19. The composition of claim 18, wherein the  
      filler is silica.

1                   2  
2 20. An aqueous composition comprising 2 to 10 %  
3       by weight of a binder; 3 to 10 % by weight of silica; 8 to  
4       20 % by weight of a mediator; and 1000 to 5000 units per  
5       gram of the aqueous composition of an enzyme for oxidizing  
      glucose.

1                   2  
2 21. The composition of claim 20, wherein the  
      silica both hydrophobic and hydrophilic surface regions.

1                   2  
2 22. The composition of claim 21, wherein the  
      binder is hydroxyethylcellulose.

1           23. The composition of claim 20, wherein the  
2           enzyme is glucose oxidase.

1           24. The composition of claim 20, wherein the  
2           mediator is ferricyanide.

1           25. A method for making a disposable test strip  
2           for the electrochemical detection of glucose, comprising the  
3           steps of:

4                 (a) applying working and reference electrode  
5                 tracks to a substrate;

6                 (b) applying a conductive base layer in contact  
7                 with the working electrode track; and

8                 (c) applying a working layer over the conductive  
9                 base layer, wherein the working layer comprising a filler  
10                 having both hydrophobic and hydrophilic surface regions such  
11                 that it forms a network upon drying, an enzyme effective to  
12                 oxidize glucose, and a mediator effective to transfer  
13                 electrons from the enzyme to the conductive base layer.

1           26. The method of claim 25, wherein the filler is  
2           non-conductive.

1           27. The method of claim 26, wherein the filler is  
2           silica.

1           28. The method of claim 27, wherein the  
2           conductive base layer comprises conductive carbon.

1           29. The method of claim 27, wherein the enzyme is  
2           glucose oxidase.

1           30. The method of claim 27, wherein the mediator  
2           is ferricyanide.

1           31. The method of claim 27, wherein the first  
2           working layer is formed from an aqueous composition  
3           comprising weight 2 to 10 % by weight of a binder 3 to 10 %  
4           by weight of silica; 8 to 20 % by weight of a mediator; and  
5           1000 to 5000 units per gram of the aqueous composition of an  
6           enzyme for oxidizing glucose.

1           32. The method of claim 31, wherein the silica is  
2           Cab-o-Sil TS610.

1           33. A disposable glucose test strip which  
2           produces a current indicative of the amount of glucose in a  
3           sample applied to the strip in response to an applied  
4           voltage, wherein the amount of current generated in response

5 to a given amount of glucose varies by less than 10 percent  
6 over a temperature range from 20°C to 37°C.

1 34. A disposable glucose test strip which  
2 produces a current indicative of the amount of glucose in a  
3 sample applied to the strip in response to an applied  
4 voltage, wherein the amount of current generated in response  
5 to a given amount of glucose varies by less than 10 percent  
6 over a hematocrit range of 0 to 60 %.

1 35. A disposable glucose test strip which  
2 produces a current indicative of the amount of glucose in a  
3 sample applied to the strip in response to an applied  
4 voltage, wherein the amount of current generated in response  
5 to a given amount of glucose decays by less than 50% in the  
6 5 seconds following peak current generation.